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㉖ Proprietor: **JAPAN TOBACCO INC.**  
2-1 Toranomon 2-chome Minato-ku  
Tokyo 105 (JP)

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㉘ Inventor: **YAMAGUCHI, Katsunori**  
6-1, Dobashi 5-chome Miyamae-ku  
Kawasaki-shi Kanagawa-ken 213 (JP)  
Inventor: **TAKEMOTO, Nagaaki**  
10-9, Minami Senzoku 2-chome Ohta-ku  
Tokyo 145 (JP)

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㉚ Representative: **Sajda, Wolf E., Dipl.-Phys. et al**  
**MEISSNER, BOLTE & PARTNER**  
Widenmayerstrasse 48 Postfach 86 06 24  
D-8000 München 86 (DE)

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## Description

### Technical Field

The present invention relates to cigarettes. More particularly, the present invention relates to cigarettes which have lower tar contents in the main and sub smoke flows without changing the number of puffs per cigarette and the air permeation amount.

### Background Art

Techniques for reducing the sub smoke flow in cigarette smoking are known as per US—A—4 231 377 and Japanese Patent Disclosure (Kokai) No. 57—163 479. A technique for reducing the main and sub smoke flows in cigarette smoking is known as per Japanese Patent Disclosure (Kokai) No. 48—61 699.

In US—A—4 231 377, a magnesium compound such as magnesia or magnesium hydroxide is added to cigarettes to reduce the sub smoke flow. This patent does not provide any description of the main smoke flow.

In Japanese Patent Disclosure (Kokai) No. 57—163 479, the sub smoke flow is reduced using a rolling material having a small amount of air permeation (about 0.5 to 8 collecters). However, this technique has its disadvantages of increase in the main smoke flow and the number of puffs.

In Japanese Patent Disclosure (Kokai) No. 48—61 699, activated carbon having a particle size of 0.177 mm or less and containing particles having a size of 0.44 mm or less in an amount of 25 to 50% is added in the amount of up to about 70% to provide an activated carbon added rolling material. This rolling material is used to wrap tobacco, and general paper then covers this rolling material thereby reducing the main and sub smoke flows. However, according to this method, the thickness of the rolling material is increased and interferes with the rolling operation of a conventional rolling machine. This leads to a need for an improved rolling machine or the development of a new type of rolling machine. Even if rolling with a conventional rolling machine can be performed, activated carbon may be separated or peeled off during rolling, thus adversely affecting the rolling conditions. This also renders maintenance of the rolling machine difficult.

From US—A—2 775 970 a cigarette paper is known wherein a fire-retarding compound, such as carboxymethyl cellulose, is added to cigarette paper. In other cases a combustion promoter, such as potassium nitrate, is added to cigarette tobacco in order to improve the fire-holding capacity of the tobacco.

### Disclosure of Invention

It is an object of the present invention to provide cigarettes which produce a reduced amount of tar when being smoked without substantially changing the number of puffs and the air permeation amount.

It is another object of the present invention to provide cigarettes which produce a reduced amount of tar when being smoked without requiring a significant change in manufacturing procedures or without adversely affecting manufacturing conditions.

In order to achieve these objects, there is provided a cigarette with shredded tobacco and a rolling material wrapping it, comprising a fire-retarding agent contained in the rolling material or applied on the outer surface of the rolling material, and a combustion promoter applied on the inner surface of the rolling material. According to one aspect of the cigarette according to the invention, the fire-retarding agent is one member selected from the group consisting of cellulose derivatives, pectines, gums, and starches, and the combustion promoter is a member selected from the group consisting of alkali metal salts and alkali earth metal salts of nitric acid, tartaric acid, phosphoric acid, fumaric acid, and citric acid.

In one particular embodiment of the invention, the fire-retarding agent is contained in the rolling material and the combustion promoter is applied on the inner surface of the rolling material. In another particular embodiment according to the invention, the fire-retarding agent is applied on the outer surface of the rolling material, and the combustion promoter is applied on the inner surface of the rolling material.

The cigarette according to the present invention has substantially the same number of puffs and air permeation as conventional cigarettes and can be manufactured by substantially the same method as that of conventional cigarettes, produces less amount of tar when being smoked than conventional cigarettes.

### Brief Description of Drawings

Fig. 1 is a perspective view of a cigarette according to an embodiment of the present invention; and

Figs. 2 and 3 are enlarged sectional views along the line a-a' in Fig. 1 for illustrating various embodiments of the present invention.

### Best Mode for Carrying Out the Invention

As shown in Fig. 1, the cigarette 10 according to the present invention has the same outer appearance as that of a conventional cigarette. That is, the cigarette 10 has shredded tobacco 12 and a rolling material 14 wrapping it. The rolling material 14 is a sheetlike material used for encircling shredded tobacco 12 and usually consists of paper. A tobacco leaf of a cigar is also a rolling material 14. A filter plug 16 is generally arranged at one end of a cigarette 10. In the cigarette 10 of the present invention, a fire-retarding agent 20 is present in the rolling material 14 or on its outer surface, and a combustion promoter 18 is present on the inner surface of the rolling material 14.

Examples of the fire-retarding agent 20 may include carbohydrates; inorganic substances such as

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antimony-containing compounds, ammonium phosphate and ammonium sulfamate; phosphorus-containing compounds such as lower alkyl phosphate and hydroxymethyl phosphonium; bromine- or chlorine-containing compounds; and mixtures thereof. Among these examples, carbohydrates are particularly preferable. Particularly preferable examples of carbohydrates are cellulose derivatives such as carboxy methyl cellulose; gums such as gum arabic; pectines; or starches.

5 The fire-retarding agent 20 is contained in the rolling material 14 or is applied on the outer surface of the rolling material 14. The fire-retarding agent 20 can be added to the rolling material 14, in the manufacture of rolling paper 14, by adding it to liquid pulp immediately before forming into paper. The fire-retarding agent 20 can be applied on the surface of the rolling material 14 by dissolving it in a suitable solvent such as water 10 and spraying the surface of the rolling material 14 with the resultant solution.

10 The amount of the fire-retarding agent 20 to be used is about 0.1 to 30% and preferably 1 to 20% with respect to the weight of the rolling material 14.

15 Examples of the combustion promoter 18 may include alkali metal salts or alkali earth metal salts of nitric acid, tartaric acid, phosphoric acid, fumaric acid and citric acid.

15 The combustion promoter 18 is coated on the inner surface of the rolling material 14. Addition of the combustion promoter 18 by coating the surface of the rolling material 14 therewith can be performed by dissolving it in a suitable solvent such as water and spraying the rolling material 14 with the resultant solution.

20 The amount of the combustion promoter 18 to be used is 0.1 to 50% and preferably 1 to 35% with respect to the weight of the rolling material 14.

20 The cigarette 10 according to the present invention can be one as shown in Fig. 2 wherein a combustion promoter 18 is coated on the inner surface of a rolling material 14, and a fire-retarding agent is contained in the rolling material 14. Alternatively, as shown in Fig. 3, a fire-retarding agent 20 can be coated on the outer surface of a rolling material 14, and a combustion promoter 18 can be coated on the inner 25 surface of the rolling material 14.

25 The relationship between an addition of a fire-retarding agent 20 and the combustibility of the rolling material 14 was examined. The combustibility of the rolling material 14 was tested in accordance with the flame contact method of the combustibility test method D of fiber materials according to the Japanese Industrial Standard JIS—L1091. A rolling material having a length of 200 mm and a width of 27 mm was wrapped around a cylinder with an outer diameter of 8 mm such that the rolling material cylinder had a length of 100 mm. The cylinder was placed in a stainless steel coil which had an inner diameter of 10 mm, a line diameter of 0.5 mm and a line pitch of 2 mm, and which was inclined at an angle of 45 degrees with respect to a horizontal plane. The lower end of this sample was brought into contact with a burner flame and 90% of the cylindrical rolling material was burnt into ash. The number of contacts of the sample with the flame of burner to burn 90% of the rolling material was observed. The above operation was repeated five times to calculate the average number of contacts of the sample with the flame as an index of the combustibility of the rolling material. The type and amount (% by weight with respect to the weight of the rolling material) of the fire-retarding agent are shown in Table 1 below. The test results are also shown in the table.

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Table 1

45	Fire-retarding agent	Amount	Average No. of contact with flame
50	carboxymethyl cellulose	2.9	4.7
	carboxymethyl cellulose	8.3	9.3
	carboxymethyl cellulose	9.8	15.0
55	gum arabic	2.0	1.5
	gum arabic	5.3	3.5
60	-- (Control)	-	1.0

65 It is seen from Table 1 above that when the fire-retarding agent is added, the number of contact of the sample with the flame is increased, and the combustibility is impaired.

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### Example

Four types of filter cigarette samples A to D of standard size according to the present invention were prepared. Each of these cigarettes had a rolling portion (the cigarette from which the filter is removed) of 63 mm length, an acetate filter of 17 mm length (overall length: 80 mm), and an outer circumferential length of 5 the rolling portion of 25 mm. A control cigarette sample-E of general type was also prepared to provide a total of 6 types of cigarettes. The samples were subjected to the smoking test according to the following method. The tar contents in the main and sub smoke flows were examined. The types and amounts (% by weight) of the fire-retarding agent and the combustion promoter in each sample and methods of adding them are shown in Table 2 below. The air permeation amount and combustibility (average number of 10 contact of the sample with the flame and the average combustion speed (mm/sec)) of each rolling material are also shown in Table 2. The air permeation amount of the rolling material is expressed in units of collecters which represent the amount of air (ml) which is passed through an area of 1 cm<sup>2</sup> of the rolling material at a differential pressure of 100 mmH<sub>2</sub>O.

Each sample was mounted in an automatic smoking machine and was smoked under standard 15 conditions. The automatic smoking machine was of a type which can separately collect tars in the main and sub smoke flows produced during smoking. The standard conditions mean a combustion length of 50 mm, a smoking frequency of once/min, a smoking volume of 35 ml/puff, and a smoking time of 2 sec/puff. The tar was collected with a Cambridge filter and the amount of the tar was measured by subtracting the water content from the weight difference of the Cambridge filter before and after tar collection. Five samples were, 20 tested each time with the automatic smoking machine, and this cycle was repeated three times. The average amount of tar in terms of weight per gram of the cigarette was calculated. The tar contents in the main and sub smoke flows and the average number of puffs are shown in Table 3 below.

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Table 2

Sample	Fire-retarding agent			Combustion promoter			Combustibility of rolling material	
	Type	Adding method	Amount	Type	Adding method	Amount	Air permeation amount	Average No. of contact with flame
A	carboxy-methyl cellulose	Applied on outer surface or rolling material	4.5	pota-sium nitrate	Applied on inner surface of rolling material	15.6	12	1
B	carboxy-methyl cellulose	Applied on outer surface of rolling material	2.8	pota-sium nitrate	Applied on inner surface of rolling material	1.2	11	1
C	carboxy-methyl cellulose	Applied on outer surface or rolling material	1.0	sodium fumarate	Applied on inner surface of rolling material	3.0	12	1
D	carboxy-methyl cellulose	Added in rolling material	20.0	pota-sium nitrate	Applied on inner surface of rolling material	30.5	13	1
E	(Control)	-	-	-	-	-	13	1

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Table 3

5	Sample	Average tar amount in smoke (mg/g)			Average No. of puffs
		Main smoke flow	Sub smoke flow	Total	
10	A	28.0	18.0	46.0	13.0
15	B	31.0	26.2	57.2	10.0
20	C	32.2	27.0	59.2	9.2
	D	29.1	12.1	41.2	10.3
	E	33.9	31.8	65.7	10.5

25 As can be seen from Table 3, as compared to sample E, with samples A to D of the present invention, the tar contents in both the main and sub smoke flows, particularly, the tar content in the sub smoke flow which is considered to be more hazardous to health, is significantly decreased. The average numbers of puffs of samples A to D of the present invention are substantially the same as that of the sample E. 30 Particularly, with samples A and D, the tar contents in the main and sub smoke flows are about 15% and 50% lower than those of sample E, respectively.

Claims

35 1. A cigarette (10) with shredded tobacco and a rolling material (14) wrapping it, comprising a fire-retarding agent, (20) contained in the rolling material (14) or applied on the outer surface of the rolling material (14), and a combustion promoter (18) applied on the inner surface of the rolling material (14).

2. The cigarette according to claim 1, wherein the fire-retarding agent (20) is one member selected from the group consisting of cellulose derivatives, pectines, gums, and starches, and the combustion promoter (18) is a member selected from the group consisting of alkali metal salts and alkali earth metal salts of nitric acid, tartaric acid, phosphoric acid, fumaric acid, and citric acid.

40 3. The cigarette according to claim 1 or 2, wherein the fire-retarding agent (20) is contained in the rolling material (14) and the combustion promoter (18) is applied on the inner surface of the rolling material (14).

45 4. The cigarette according to claim 1 or 2, wherein the fire-retarding agent (20) is applied on the outer surface of the rolling material (14), and the combustion promoter (18) is applied on the inner surface of the rolling material (14).

50 5. Patentansprüche

1. Zigarette (10) mit geschnittenem Tabak und einem Hüllmaterial (14), das ihn umhüllt, umfassend ein feuerhemmendes Mittel (20), das in dem Hüllmaterial (14) enthalten oder auf die Außenoberfläche des Hüllmaterials (14) aufgebracht ist, und einen Verbrennungsbeschleuniger (18), der auf die Innenoberfläche des Hüllmaterials (14) aufgebracht ist.

55 2. Zigarette nach Anspruch 1, wobei das feuerhemmende Mittel (20) ein Mittel ist, das aus der Gruppe gewählt ist, die aus Zellulosederivaten, Pektinen, Kautschuk und Stärken besteht, und wobei der Verbrennungsbeschleuniger (18) ein aus der Gruppe ausgewähltes Element ist, die aus Alkalimetallsalzen und Erdalkalimetallsalzen der Salpetersäure, Weinsäure, Phosphorsäure, Fumarsäure und Zitronensäure besteht.

60 3. Zigarette nach Anspruch 1 oder 2, wobei das feuerhemmende Mittel (20) in dem Hüllmaterial (14) enthalten und der Verbrennungsbeschleuniger (18) auf die Innenoberfläche des Hüllmaterials (14) aufgebracht ist.

65 4. Zigarette nach Anspruch 1 oder 2, wobei das feuerhemmende Mittel (20) auf die Außenoberfläche des Hüllmaterials (14) aufgebracht und der Verbrennungsbeschleuniger (18) auf die Innenoberfläche des Hüllmaterials aufgebracht ist.

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## **Revendications**

1. Cigarette (10) avec du tabac coupé en petites brins et un matériau (14) pour la rouler, qui l'enveloppe, comportant un agent retardateur du feu (20) contenu dans le matériau (14) dans lequel on roule la cigarette, ou appliqué sur la surface extérieure de ce matériau (14), ainsi qu'un promoteur de combustion (18) appliqué sur la surface extérieur du matériau (14) dans lequel on roule la cigarette.
2. Cigarette selon la revendication 1, dans laquelle l'agent retardateur du feu (20) est un produit choisi dans un groupe constitué de dérivés de la cellulose, pectines, gommes et amidons; et dans laquelle le promoteur de combustion (18) est un produit choisi dans le groupe constitué des sels de métal alcalin et de métal alcalino-terreux de l'acide nitrique, de l'acide tartrique, de l'acide phosphorique, de l'acide fumarique et de l'acide citrique.
3. Cigarette selon la revendication 1 ou 2 dans laquelle l'agent retardateur du feu (20) est contenu dans le matériau (14) dans laquelle on la roule; et dans laquelle le promoteur de combustion (18) est appliqué sur la surface intérieure du matériau (14) dans lequel on roule la cigarette.
4. Cigarette selon la revendication 1 ou 2, dans laquelle l'agent retardateur du feu (20) est appliqué sur la surface extérieure du matériau (14) dans lequel on la roule; et dans laquelle le promoteur de combustion (18) est appliqué sur la surface intérieure du matériau (14) dans lequel on roule la cigarette.

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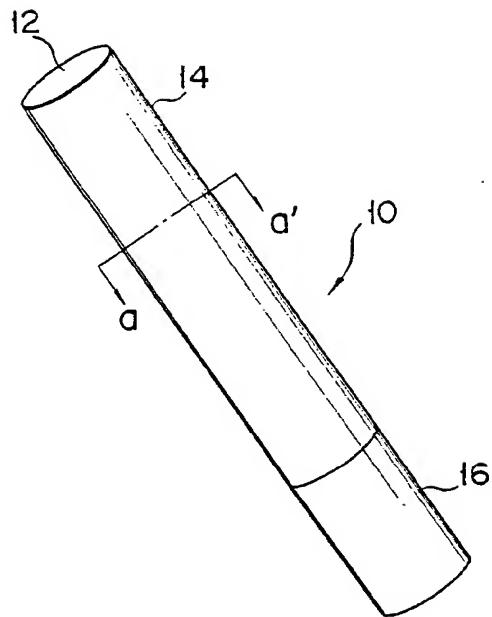
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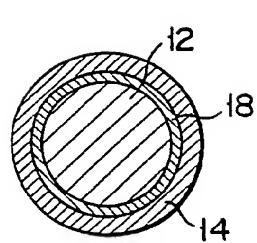
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F I G. 1



F I G. 2



F I G. 3

